BRAKE SHOE ASSEMBLY HAVING A CORROSION REDUCING LINING

BACKGROUND OF THE INVENTION

[1] The present invention relates to a brake shoe assembly, and more particularly to a plurality of radial apertures which provide a moisture escape path.

[2] Most vehicles include a brake system having a set of brake shoe assemblies for retarding the rotation of the wheels of the vehicle when the brakes are applied. Typically, each brake shoe assembly includes a brake lining made of a friction material mounted to a support or brake shoe table. The brake lining gradually wears away during brake applications. After numerous brake applications, the brake lining wears below a critical material thickness and, therefore, should be replaced. As a result, the brake linings are separate components which are removably mounted to the brake shoe table. Dissimilar materials and face to face mounting may result in moisture retention, corrosion, and possible brake lining fracture.

[3] Accordingly, it is desirable to provide brake shoe assemblies which minimize moisture retention and the possibility of corrosion.

SUMMARY OF THE INVENTION

[4] The brake shoe assemblies according to the present invention provide a plurality of drain openings located through a brake shoe table which correspond with drain openings in a brake lining. As the brake linings are removably attached to the brake shoe table, alignment of the drain openings is inherently provided. The drain openings provide an unobstructed moisture escape path from the concave brake shoe table inner surface such as within a trough between support struts to thereby minimize moisture retention and the possibility of corrosion.

BRIEF DESCRIPTION OF THE DRAWINGS

[5] The various features and advantages of this invention will become apparent to those skilled in the art from the following detailed description of the currently preferred embodiment. The drawings that accompany the detailed description can be briefly described as follows:

[6] Figure 1 is a schematic view an exemplary drum brake system designed according to the present invention;

[7] Figure 2A is an exploded perspective view of a brake shoe assembly according to the present invention;

[8] Figure 2B is a sectional view of the brake assembly taken along line 2B-2B in Figure 1; and

[9] Figure 3 is an exploded perspective view of another brake shoe assembly according to the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

[10] Figure 1 illustrates a general schematic view of a drum brake system 10. The drum brake system 10 includes a cylindrical brake drum 12, a first and second brake shoe assembly generally shown at 14,16 and an actuator 18. The general operation of the brake drum assembly 10 is known. The drum brake system 10 can be of various types of systems such as an s-cam brake, a wedge brake, or a drum brake actuated by a hydraulic cylinder. The actuator 18, shown schematically in Figure 1, represents any known actuating mechanism for drum brake systems such as a cam mechanism, a wedge mechanism, or a hydraulic cylinder. The actuator 18 moves the first and second brake shoe assemblies 14, 16 into contact with the rotating brake drum 12 and can be controlled hydraulically or pneumatically. Also, as known, a single actuator could move both the first and second brake shoe assemblies 14, 16 into contact with the rotating brake drum 12.

[11] The brake drum 12, which rotates about an axis of rotation 20, has an inner surface 22 and an outer surface 24. The brake shoe assemblies 14, 16 are located adjacent to the inner surface 22 of the brake drum 12. Each brake shoe assembly 14, 16 include a brake lining 26 of a known friction material supported upon an arcuate brake shoe table 28. Each brake lining 26 presents a wear surface 32 which contacts the inner surface 22 of the rotating brake drum 12 when the actuator 18 moves the first and second brake shoe assemblies 14 and 16 against the brake drum 12.

[12] Referring to Figure 2A, one of the first and second brake shoe assemblies 14, 16 is illustrated, and although the first brake shoe assembly 14 is referred to, such description applies equally to the second brake shoe assembly 16. The brake shoe assembly 14 includes the arcuate brake shoe table 28 and the brake lining 26. Each brake lining 26 includes an interface surface 34 which contacts the brake shoe table 28 along a convex brake shoe table outer surface 36. Preferably, fasteners 38 such as rivets or the like removably attach the brake lining 26 to the brake shoe table 28 thereby providing for replacement of the brake lining 26 once consumed. The fasteners 38 are typically mounted within apertures 39. It should be understood that although a particular fastener arrangement is illustrated in the disclosed embodiment, other attachments will also benefit from the present invention such as a central wedge 40 and flanges 42 (Figure 3).

[13] A concave brake shoe table inner surface 37 of the arcuate brake shoe table 28 is mounted to a similarly curved web 44. The web 44 typically includes a pair of arcuate struts 46 (Figure 2B), although it should be understood that a single strut may also be provided to form the web.

[14] The struts 46 are preferably formed of a high strength metal such as steel and include an outer convex edge 48 and an inner concave edge 50. Notches 52 or the like may be formed into the struts 46 for engagement with an anchor pin and roller (not shown) of the drum brake system 10 (Figure 1) as generally known.

[15] The brake shoe table 28 is mounted to the outer convex edge 48 of the struts 46 by welding or the like. The brake shoe table 28 is thereby supported by the web 44. Although illustrated in a schematic and somewhat exaggerated form in Figure 1, the first and second brake shoe assemblies 14, 16 and the actuators 18 are relatively closely spaced together. Moisture caused from water, snow, mud, ice, de-icing chemical compounds, etc., heretofore have tended to collect within a concave trough 45 between the struts 46 and between the brake lining 26 and arcuate brake shoe table 28. Moisture typically cannot drain from within the trough 45 (Figure 2B) as the end of the trough 45 are commonly plugged by road debris, grease and the like. The trapped moisture may tend to corrode the web 44, the brake shoe table 28 and the convex brake shoe table outer surface 36. Such corrosion may also lift the fasteners 38 and cause "jacking" of the linings which may eventually lead to cracking. Rust "jacking" is the process where by lining blocks crack due to the formation of an oxide rust layer between the bottom of the lining block and the top of the brake shoe table surface that tends to raise the block off the shoe. Since the rivets hold the block tightly to the table the result is cracks in the block near the rivets.

[16] A plurality of drain openings 54a are located through the brake shoe table 28 which correspond with drain openings 54b in the linings 26. The drain openings 54a, 54b are located radially about the axis of rotation 20 and are preferably located along a length of the brake shoe table 28 and between the struts 46, however, other arrangements will also benefit from the present invention.

[17] As the brake linings 26 are removably attached to the brake shoe table 28, alignment of the drain openings is inherently provided. That is, as apertures 39 for fasteners 38 must be in line, an affixed relationship between brake shoe table 28 and lining 26 is provided. The drain openings 54a, 54b thereby provide an unobstructed moisture escape path (illustrated schematically by arrows in Figure 2B) from the concave brake shoe table inner surface 37, such as within the trough 45, to thereby minimize moisture retention and the possibility of corrosion and "jacking". As a plurality of drain openings 54a, 54b are provided possible

blockage of one or more does not greatly diminish the escape path. It should be further understood that the drain opening 54a, 54b may not be in perfect alignment so long as a moisture escape path is defined.

[18] The drain openings 54a, 54b are not limited to circular openings and alternatively of additionally include slots 54a', 54b' (Figure 3) or the like. Moreover, the drain openings 54a may be of a different configuration than drain openings 54b. The drain openings 54a, 54b also provide a weight reduction and additional cooling paths while only slightly decreasing the brake lining wear surface 32. Moreover, the drain openings 54a, 54b by providing circulatory airflow therethrough, moisture which may not drain is more readily evaporated to further minimize moisture retention and the possibility of corrosion and "jacking".

[19] The foregoing description is exemplary rather than defined by the limitations within. Many modifications and variations of the present invention are possible in light of the above teachings. The preferred embodiments of this invention have been disclosed, however, one of ordinary skill in the art would recognize that certain modifications would come within the scope of this invention. It is, therefore, to be understood that within the scope of the appended claims, the invention may be practiced otherwise than as specifically described. For that reason the following claims should be studied to determine the true scope and content of this invention.